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Increases in Agricultural Productivity, 1948-1993

- Agricultural productivity, output per unit of input, increased at an average annual rate of 1.8 percent over the 1948-1993 period.
- Productivity growth was the principal factor responsible for economic growth in the agricultural sector. Aggregate agricultural input use changed very little during the period.
- The relatively stable aggregate input level disguises larger shifts in individual inputs: chemical and other purchased inputs and capital increased while labor input declined.

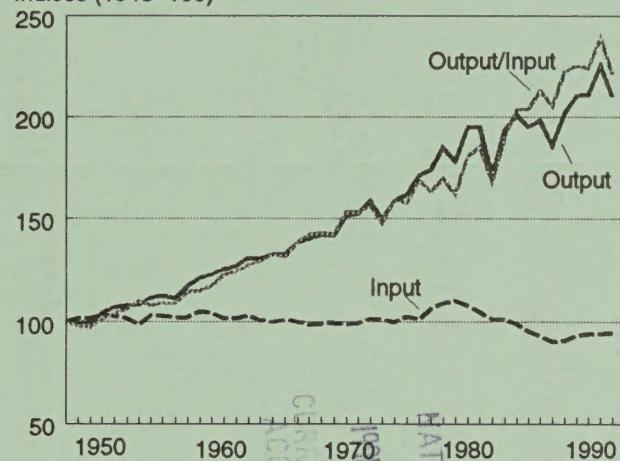
During the 1948-93 period, agriculture's productivity growth rate of 1.8 percent per year exceeded the 1.1 percent average annual rate in the private nonfarm sector.

Agricultural producers increased productivity and held down production costs by substituting capital (primarily durable equipment) and purchased inputs (mainly pesticides, fertilizer, energy, seeds, feed, and livestock) for labor. This is clear from labor's decreasing share in total input cost. Labor costs (including the imputation of self-employed labor) fell from 41 percent of total farm input costs in 1948 to 24 percent in 1993. In contrast, the share of capital in total input costs increased from 9 percent in 1948 to 28 percent in 1993. Purchased inputs accounted for approximately 50 percent of the total cost of agricultural inputs in both years.

The stable input cost share for purchased inputs disguises significant shifts within this broad category during the 1948-93 period. While purchased inputs in aggregate increased at an average rate of 1.3 percent per year, pesticide

Productivity growth in U.S. agriculture, 1948-93

Indices (1948=100)



Source: USDA, ERS estimates

consumption grew by 6.1 percent, and feed, seed, and livestock purchases grew by 2.2 percent per year. In contrast, fertilizer use increased only 1.7 percent annually, and energy inputs less than 1 percent.

Among other input categories, labor in agriculture declined at an average annual rate of 2.7 percent over the postwar period, with greater reductions occurring in self-employed labor than in hired labor. Capital input to agriculture increased dramatically in the immediate postwar period, but the average annual rate of growth over the entire 1948-93 period was less than 1 percent (0.7). Farm real estate inputs declined modestly.

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About AREI UPDATES

AREI UPDATES is a periodic series that supplements and updates information in **Agricultural Resources and Environmental Indicators (AREI)**, USDA, ERS, AH-705, Dec. 1994. UPDATES report recent data from surveys of farm operators and others knowledgeable about changing agricultural resource use and conditions, with only minimal interpretation or analysis. Please contact the individual listed at the end of the text for additional information about the data in this UPDATE. If you would like to be added to the mailing list or have other questions about AREI UPDATES or AREI, contact Richard Magleby, (202) 219-0436. [rmagleby@econ.ag.gov]

Table 1. Farm production, input use and productivity, 1948-1993 (1948=100)

| Year | Livestock and livestock products | | | | | Crops | | | | | | | |
|--------------------------------|----------------------------------|------------------|--------------|----------------|------------------|------------------|-------------|------------|-----------|-------------|------------------------|-----------------------|---------------------|
| | Farm output | All ¹ | Meat animals | Dairy products | Poultry and eggs | All ² | Food grains | Feed crops | Oil crops | Sugar crops | Cotton and cotton-seed | Vegetables and melons | Fruit and tree nuts |
| 1948 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1949 | 100 | 106 | 105 | 103 | 114 | 95 | 86 | 91 | 91 | 105 | 110 | 103 | 89 |
| 1950 | 99 | 110 | 113 | 97 | 123 | 91 | 80 | 93 | 107 | 132 | 68 | 103 | 86 |
| 1951 | 104 | 116 | 121 | 98 | 131 | 95 | 79 | 90 | 98 | 105 | 104 | 94 | 95 |
| 1952 | 107 | 118 | 123 | 98 | 134 | 99 | 101 | 93 | 97 | 109 | 103 | 91 | 93 |
| 1953 | 108 | 120 | 122 | 103 | 137 | 99 | 93 | 92 | 94 | 123 | 114 | 101 | 95 |
| 1954 | 108 | 124 | 128 | 104 | 145 | 96 | 82 | 95 | 106 | 137 | 95 | 99 | 98 |
| 1955 | 112 | 127 | 134 | 105 | 143 | 100 | 77 | 100 | 121 | 123 | 104 | 103 | 102 |
| 1956 | 113 | 130 | 130 | 106 | 159 | 100 | 81 | 98 | 142 | 125 | 92 | 102 | 104 |
| 1957 | 112 | 128 | 126 | 106 | 162 | 99 | 76 | 107 | 141 | 145 | 76 | 104 | 106 |
| 1968 | 118 | 129 | 128 | 105 | 172 | 108 | 112 | 114 | 172 | 142 | 80 | 103 | 97 |
| 1959 | 121 | 135 | 138 | 104 | 178 | 110 | 90 | 115 | 152 | 159 | 101 | 107 | 106 |
| 1960 | 123 | 134 | 135 | 105 | 175 | 114 | 107 | 120 | 163 | 196 | 101 | 100 | 112 |
| 1961 | 125 | 140 | 140 | 108 | 189 | 115 | 98 | 111 | 189 | 220 | 100 | 111 | 115 |
| 1962 | 127 | 141 | 143 | 108 | 188 | 116 | 91 | 114 | 191 | 226 | 104 | 108 | 117 |
| 1963 | 131 | 145 | 150 | 107 | 192 | 120 | 96 | 119 | 201 | 281 | 107 | 109 | 113 |
| 1964 | 130 | 149 | 155 | 109 | 199 | 116 | 106 | 109 | 202 | 286 | 106 | 99 | 115 |
| 1965 | 133 | 144 | 147 | 107 | 205 | 123 | 109 | 124 | 243 | 262 | 103 | 101 | 121 |
| 1966 | 133 | 147 | 152 | 103 | 217 | 122 | 110 | 123 | 261 | 262 | 66 | 112 | 124 |
| 1967 | 138 | 152 | 159 | 102 | 227 | 128 | 124 | 135 | 273 | 256 | 54 | 113 | 123 |
| 1968 | 140 | 152 | 161 | 101 | 221 | 131 | 131 | 131 | 307 | 300 | 72 | 120 | 121 |
| 1969 | 142 | 152 | 162 | 100 | 226 | 135 | 121 | 135 | 313 | 302 | 85 | 115 | 143 |
| 1970 | 142 | 158 | 171 | 101 | 236 | 129 | 113 | 126 | 319 | 294 | 72 | 114 | 136 |
| 1971 | 151 | 160 | 174 | 102 | 239 | 144 | 133 | 153 | 354 | 301 | 72 | 115 | 142 |
| 1972 | 152 | 162 | 175 | 104 | 246 | 144 | 127 | 149 | 356 | 316 | 94 | 117 | 127 |
| 1973 | 158 | 164 | 182 | 99 | 239 | 154 | 140 | 154 | 428 | 296 | 88 | 115 | 153 |
| 1974 | 149 | 161 | 177 | 100 | 239 | 141 | 149 | 129 | 343 | 271 | 80 | 120 | 157 |
| 1975 | 158 | 152 | 161 | 100 | 234 | 160 | 176 | 153 | 430 | 320 | 63 | 120 | 168 |
| 1976 | 161 | 160 | 168 | 104 | 253 | 159 | 175 | 154 | 362 | 330 | 79 | 125 | 162 |
| 1977 | 170 | 163 | 169 | 106 | 259 | 173 | 165 | 165 | 493 | 297 | 95 | 129 | 172 |
| 1978 | 173 | 163 | 168 | 105 | 272 | 178 | 153 | 178 | 524 | 299 | 73 | 137 | 169 |
| 1979 | 184 | 166 | 172 | 106 | 277 | 196 | 179 | 189 | 637 | 271 | 99 | 140 | 180 |
| 1980 | 178 | 174 | 178 | 111 | 297 | 178 | 199 | 160 | 491 | 284 | 74 | 140 | 196 |
| 1981 | 194 | 177 | 178 | 114 | 308 | 205 | 235 | 192 | 559 | 317 | 106 | 143 | 193 |
| 1982 | 195 | 175 | 171 | 117 | 309 | 206 | 228 | 197 | 608 | 279 | 78 | 151 | 192 |
| 1983 | 170 | 179 | 174 | 120 | 311 | 161 | 194 | 129 | 457 | 285 | 54 | 145 | 192 |
| 1984 | 193 | 176 | 170 | 116 | 319 | 201 | 214 | 191 | 527 | 279 | 88 | 154 | 190 |
| 1985 | 201 | 181 | 170 | 123 | 333 | 211 | 200 | 211 | 581 | 283 | 89 | 165 | 188 |
| 1986 | 194 | 182 | 170 | 123 | 347 | 199 | 176 | 201 | 535 | 300 | 65 | 165 | 182 |
| 1987 | 198 | 186 | 172 | 123 | 378 | 202 | 177 | 178 | 533 | 330 | 100 | 179 | 208 |
| 1988 | 185 | 190 | 175 | 125 | 387 | 178 | 160 | 131 | 437 | 314 | 105 | 163 | 224 |
| 1989 | 201 | 191 | 175 | 124 | 402 | 204 | 175 | 179 | 530 | 315 | 82 | 172 | 214 |
| 1990 | 210 | 193 | 174 | 127 | 427 | 218 | 226 | 185 | 529 | 320 | 104 | 188 | 212 |
| 1991 | 211 | 198 | 180 | 127 | 446 | 215 | 172 | 181 | 567 | 332 | 119 | 195 | 207 |
| 1992 | 225 | 203 | 181 | 130 | 466 | 237 | 211 | 211 | 603 | 347 | 119 | 202 | 220 |
| 1993 | 209 | 204 | 181 | 129 | 485 | 208 | 202 | 161 | 515 | 327 | 109 | 189 | 231 |
| Average annual rates of growth | | | | | | | | | | | | | |
| 1948-93 | 1.65 | 1.58 | 1.31 | 0.57 | 3.51 | 1.64 | 1.56 | 1.06 | 3.64 | 2.64 | 0.19 | 1.42 | 1.86 |
| 1948-53 | 1.53 | 3.59 | 4.05 | 0.56 | 6.35 | -0.25 | -1.43 | -1.75 | -1.18 | 4.20 | 2.64 | 0.20 | -1.00 |
| 1953-57 | 0.83 | 1.64 | 0.62 | 0.85 | 4.16 | 0.10 | -4.94 | 3.89 | 10.05 | 4.00 | -10.14 | 0.69 | 2.69 |
| 1957-60 | 3.25 | 1.65 | 2.36 | -0.38 | 2.48 | 4.72 | 11.32 | 3.83 | 4.84 | 10.04 | 9.42 | -1.14 | 1.76 |
| 1960-66 | 1.30 | 1.54 | 2.02 | -0.35 | 3.62 | 1.07 | 0.35 | 0.37 | 7.83 | 4.86 | -7.02 | 1.90 | 1.71 |
| 1966-69 | 2.27 | 1.02 | 2.06 | -0.88 | 1.35 | 3.39 | 3.28 | 3.24 | 6.14 | 4.74 | 8.50 | 0.82 | 4.78 |
| 1969-73 | 2.70 | 1.89 | 2.94 | -0.24 | 1.34 | 3.34 | 3.66 | 3.22 | 7.79 | -0.53 | 0.73 | -0.10 | 1.72 |
| 1973-79 | 2.55 | 0.24 | -0.95 | 1.14 | 2.49 | 4.02 | 4.08 | 3.42 | 6.64 | -1.45 | 1.88 | 3.29 | 2.75 |
| 1979-89 | 0.87 | 1.39 | 0.18 | 1.51 | 3.72 | 0.41 | -0.20 | -0.51 | -1.84 | 1.50 | -1.89 | 2.05 | 1.69 |
| 1989-93 | 1.03 | 1.62 | 0.77 | 1.06 | 4.67 | 0.57 | 3.52 | -2.65 | -0.74 | 0.98 | 7.31 | 2.44 | 1.95 |

See footnotes at end of table.

Table 1. Farm production, input use and productivity, 1948-1993 (1948=100)--continued

| Year | Total factor input | Purchased inputs | | | | | Labor | | | Capital | | | Total factor productivity | |
|--------------------------------|--------------------|------------------|------------|------------|-----------------------|---|-------|-------|---------------|---------|-------------------|-------------|---------------------------|-------|
| | | All ³ | Fertilizer | Pesticides | Fuels and electricity | Feed, seed and livestock purchases ⁴ | All | Hired | Self-employed | All | Durable equipment | Real estate | Inventories | |
| | | | | | | | | | | | | | | |
| 1948 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 1949 | 102 | 104 | 103 | 118 | 111 | 104 | 98 | 93 | 99 | 110 | 118 | 102 | 108 | 98 |
| 1950 | 102 | 105 | 124 | 149 | 114 | 103 | 94 | 97 | 93 | 120 | 136 | 103 | 107 | 98 |
| 1951 | 103 | 109 | 123 | 138 | 117 | 108 | 90 | 94 | 89 | 129 | 152 | 105 | 110 | 101 |
| 1952 | 103 | 110 | 130 | 135 | 123 | 107 | 88 | 91 | 86 | 136 | 165 | 106 | 115 | 104 |
| 1953 | 102 | 111 | 126 | 143 | 126 | 109 | 83 | 89 | 81 | 140 | 172 | 107 | 118 | 106 |
| 1954 | 98 | 104 | 130 | 163 | 125 | 100 | 81 | 84 | 80 | 144 | 180 | 108 | 116 | 110 |
| 1955 | 104 | 114 | 131 | 212 | 128 | 113 | 82 | 82 | 82 | 146 | 183 | 109 | 119 | 108 |
| 1956 | 103 | 117 | 139 | 299 | 128 | 117 | 77 | 75 | 78 | 147 | 184 | 109 | 121 | 109 |
| 1957 | 102 | 121 | 140 | 225 | 126 | 123 | 72 | 72 | 72 | 146 | 181 | 109 | 118 | 109 |
| 1968 | 102 | 125 | 138 | 261 | 123 | 129 | 69 | 73 | 68 | 145 | 178 | 109 | 122 | 115 |
| 1959 | 105 | 133 | 158 | 332 | 125 | 131 | 69 | 71 | 68 | 146 | 178 | 109 | 126 | 115 |
| 1960 | 104 | 132 | 162 | 337 | 127 | 130 | 67 | 71 | 66 | 146 | 180 | 109 | 128 | 118 |
| 1961 | 102 | 129 | 168 | 385 | 129 | 124 | 65 | 71 | 63 | 143 | 177 | 106 | 130 | 123 |
| 1962 | 102 | 131 | 144 | 435 | 131 | 129 | 64 | 70 | 63 | 142 | 174 | 105 | 134 | 124 |
| 1963 | 103 | 135 | 160 | 451 | 133 | 133 | 63 | 70 | 60 | 143 | 174 | 105 | 138 | 127 |
| 1964 | 101 | 134 | 179 | 435 | 136 | 130 | 59 | 63 | 58 | 143 | 176 | 105 | 140 | 129 |
| 1965 | 100 | 134 | 189 | 525 | 137 | 127 | 58 | 60 | 57 | 143 | 179 | 104 | 135 | 133 |
| 1966 | 101 | 143 | 216 | 616 | 140 | 138 | 54 | 54 | 54 | 145 | 184 | 103 | 142 | 131 |
| 1967 | 100 | 142 | 216 | 509 | 139 | 138 | 51 | 50 | 51 | 149 | 191 | 106 | 143 | 138 |
| 1968 | 99 | 140 | 164 | 607 | 140 | 140 | 49 | 48 | 50 | 150 | 200 | 105 | 146 | 142 |
| 1969 | 99 | 145 | 178 | 659 | 142 | 148 | 48 | 49 | 48 | 149 | 203 | 103 | 149 | 143 |
| 1970 | 100 | 147 | 183 | 722 | 142 | 152 | 48 | 49 | 47 | 150 | 205 | 103 | 150 | 142 |
| 1971 | 99 | 144 | 184 | 851 | 139 | 148 | 47 | 49 | 46 | 152 | 207 | 105 | 148 | 153 |
| 1972 | 99 | 148 | 185 | 1024 | 138 | 152 | 46 | 48 | 46 | 151 | 207 | 103 | 156 | 153 |
| 1973 | 102 | 152 | 214 | 1049 | 140 | 151 | 47 | 49 | 46 | 156 | 211 | 107 | 159 | 156 |
| 1974 | 101 | 154 | 236 | 949 | 133 | 150 | 43 | 52 | 40 | 160 | 223 | 109 | 165 | 147 |
| 1975 | 100 | 149 | 211 | 968 | 156 | 143 | 43 | 53 | 40 | 161 | 232 | 108 | 160 | 159 |
| 1976 | 103 | 158 | 228 | 1107 | 176 | 150 | 43 | 54 | 39 | 163 | 237 | 108 | 169 | 157 |
| 1977 | 101 | 155 | 230 | 1016 | 184 | 143 | 41 | 52 | 38 | 165 | 244 | 109 | 164 | 168 |
| 1978 | 107 | 176 | 234 | 1382 | 193 | 166 | 39 | 51 | 36 | 165 | 250 | 107 | 170 | 163 |
| 1979 | 109 | 186 | 246 | 1655 | 176 | 177 | 38 | 51 | 34 | 168 | 258 | 108 | 173 | 167 |
| 1980 | 110 | 190 | 294 | 1551 | 171 | 187 | 37 | 49 | 33 | 172 | 266 | 110 | 183 | 161 |
| 1981 | 108 | 181 | 261 | 2050 | 164 | 177 | 37 | 47 | 34 | 171 | 266 | 110 | 171 | 180 |
| 1982 | 105 | 171 | 198 | 1541 | 155 | 183 | 36 | 46 | 33 | 169 | 261 | 108 | 184 | 185 |
| 1983 | 101 | 173 | 192 | 1331 | 150 | 187 | 34 | 45 | 31 | 159 | 249 | 100 | 181 | 168 |
| 1984 | 101 | 169 | 230 | 1398 | 155 | 168 | 34 | 43 | 31 | 162 | 236 | 106 | 160 | 190 |
| 1985 | 99 | 164 | 221 | 1282 | 139 | 170 | 33 | 41 | 30 | 159 | 224 | 106 | 172 | 203 |
| 1986 | 95 | 161 | 255 | 1326 | 130 | 171 | 31 | 40 | 28 | 153 | 208 | 102 | 166 | 203 |
| 1987 | 93 | 161 | 215 | 1325 | 144 | 167 | 30 | 39 | 27 | 145 | 192 | 98 | 162 | 212 |
| 1988 | 91 | 152 | 198 | 1176 | 144 | 163 | 31 | 40 | 28 | 143 | 182 | 98 | 157 | 205 |
| 1989 | 91 | 153 | 192 | 1378 | 143 | 158 | 31 | 38 | 29 | 142 | 174 | 100 | 149 | 222 |
| 1990 | 93 | 165 | 195 | 1414 | 142 | 171 | 31 | 39 | 28 | 141 | 169 | 99 | 157 | 225 |
| 1991 | 94 | 167 | 197 | 1562 | 143 | 167 | 31 | 37 | 29 | 140 | 166 | 99 | 163 | 224 |
| 1992 | 94 | 173 | 199 | 1576 | 142 | 176 | 29 | 36 | 28 | 139 | 161 | 99 | 163 | 239 |
| 1993 | 95 | 179 | 212 | 1545 | 142 | 175 | 29 | 38 | 26 | 136 | 155 | 97 | 170 | 221 |
| Average annual rates of growth | | | | | | | | | | | | | | |
| 1948-93 | -0.11 | 1.30 | 1.67 | 6.08 | 0.78 | 2.15 | -2.75 | -2.16 | -2.95 | 0.69 | 0.98 | -0.07 | 1.18 | 1.76 |
| 1948-53 | 0.39 | 2.05 | 4.62 | 7.15 | 4.57 | 1.77 | -3.76 | -2.38 | -4.20 | 6.78 | 10.80 | 1.37 | 3.41 | 1.14 |
| 1953-57 | 0.08 | 2.15 | 2.63 | 11.33 | 0.16 | 2.91 | -3.41 | -5.21 | -2.83 | 0.98 | 1.35 | 0.49 | -0.16 | 0.75 |
| 1957-60 | 0.71 | 3.07 | 4.87 | 13.47 | 0.03 | 1.94 | -2.52 | -0.56 | -3.17 | 0.08 | -0.21 | -0.01 | 2.65 | 2.54 |
| 1960-66 | -0.55 | 1.35 | 4.79 | 10.05 | 1.66 | 1.02 | -3.69 | -4.60 | -3.41 | -0.20 | 0.40 | -0.93 | 1.75 | 1.84 |
| 1966-69 | -0.57 | 0.37 | -6.45 | 2.25 | 0.52 | 2.23 | -3.45 | -3.26 | -3.50 | 1.12 | 3.20 | -0.04 | 1.56 | 2.84 |
| 1969-73 | 0.60 | 1.24 | 4.60 | 11.62 | -0.38 | 0.60 | -0.97 | 0.18 | -1.33 | 1.00 | 0.94 | 0.92 | 1.76 | 2.10 |
| 1973-79 | 1.17 | 3.33 | 2.32 | 7.60 | 3.79 | 2.60 | -3.31 | 0.51 | -4.76 | 1.26 | 3.37 | 0.18 | 1.37 | 1.38 |
| 1979-89 | -1.86 | -1.97 | -2.48 | -1.83 | -2.06 | -1.13 | -2.17 | -2.99 | -1.82 | -1.65 | -3.94 | -0.77 | -1.46 | 2.72 |
| 1989-93 | 1.17 | 3.98 | 2.48 | 2.86 | -0.10 | 2.66 | -1.40 | 0.15 | -2.03 | -1.05 | -2.81 | -0.84 | 3.23 | -0.14 |

¹Includes wool, mohair, horses, mules, honey, beeswax, bees, goats, rabbits, aquaculture, and fur animals. These items are not included in the separate groups of livestock and products shown.

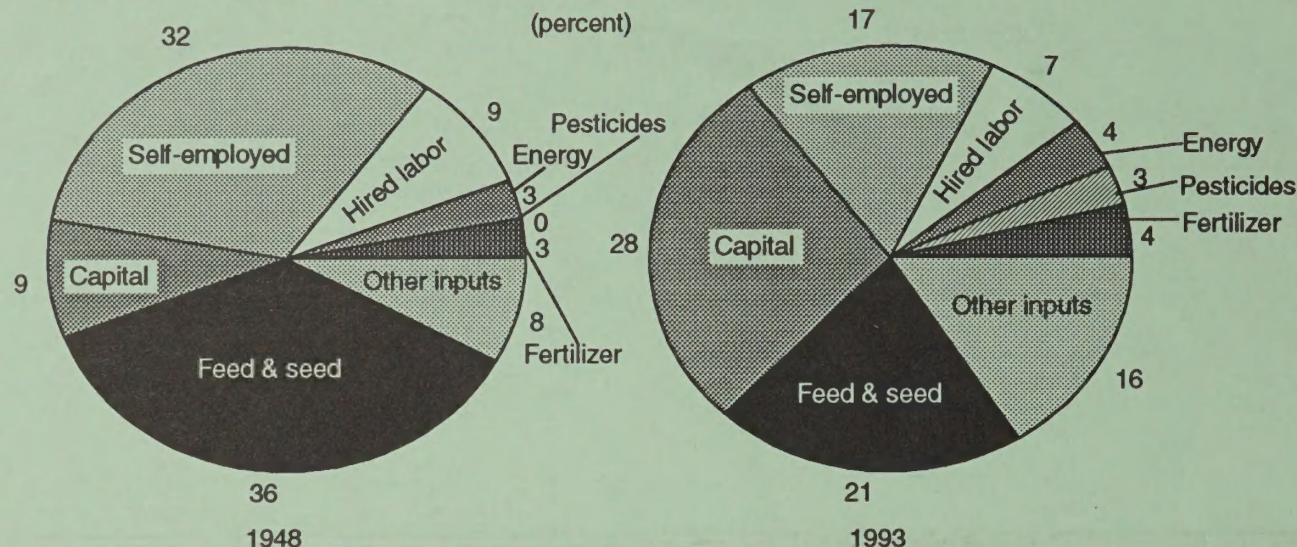
²Includes tobacco, floriculture and ornamentals, Christmas trees, mushrooms, legume and grass seeds, hops, mint, broomcorn, popcorn, hemp fiber and seed, and flax fiber not shown separately.

³Includes purchased services such as contract labor services, custom machine services, machine and building maintenance and repairs, irrigation fees paid public sellers of water and miscellaneous farm production items.

⁴Includes broiler- and egg-type chicks and turkey pouls and imports of livestock for purposes other than immediate slaughter.

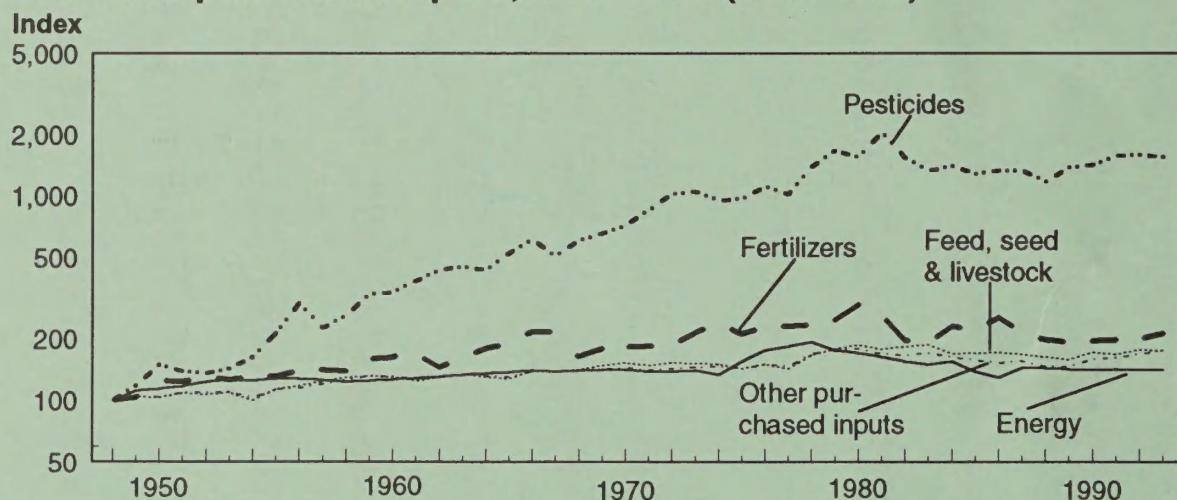
Source: USDA, ERS estimates.

Input cost shares, 1948 and 1993



Note: Pesticides in 1948=0.3%

Growth in purchased inputs, 1948-1993 (1948=100)



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